

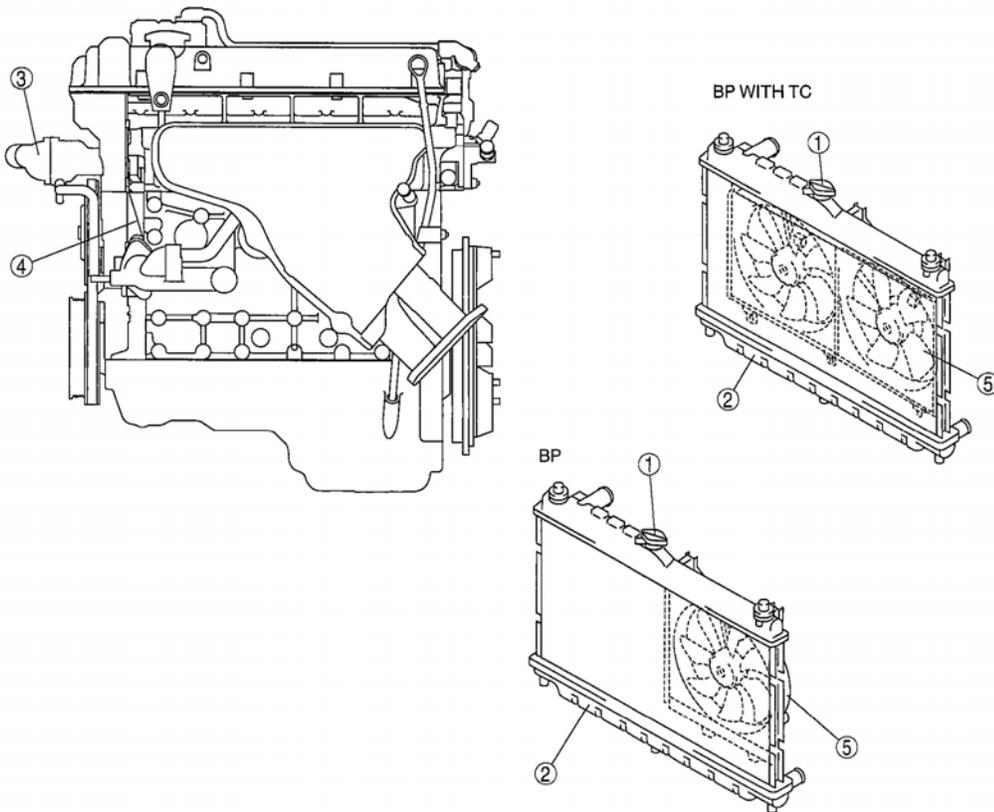
# 2005 Mazda MX-5 Miata

2005 ENGINE Cooling System - MX-5 Miata

## 2005 ENGINE

### Cooling System - MX-5 Miata

#### COOLING SYSTEM LOCATION INDEX



1	Radiator cap (See RADIATOR CAP INSPECTION.)
2	Radiator (See RADIATOR REMOVAL/ INSTALLATION [BP].) (See RADIATOR REMOVAL/ INSTALLATION [BP WITH TC].)
3	Thermostat (See THERMOSTAT REMOVAL/ INSTALLATION.) (See THERMOSTAT INSPECTION.)

4	Water pump (See WATER PUMP REMOVAL/ INSTALLATION.)
5	Cooling fan motor (See COOLING FAN MOTOR INSPECTION [BP].) (See COOLING FAN MOTOR INSPECTION [BP WITH TC].) (See COOLING FAN MOTOR REMOVAL/INSTALLATION [BP].) (See COOLING FAN MOTOR REMOVAL/INSTALLATION [BP WITH TC].)

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**Fig. 1: Identifying Cooling System Location Index**  
Courtesy of MAZDA MOTORS CORP.

#### COOLING SYSTEM SERVICE WARNINGS

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### 2005 ENGINE Cooling System - MX-5 Miata

#### **WARNING:**

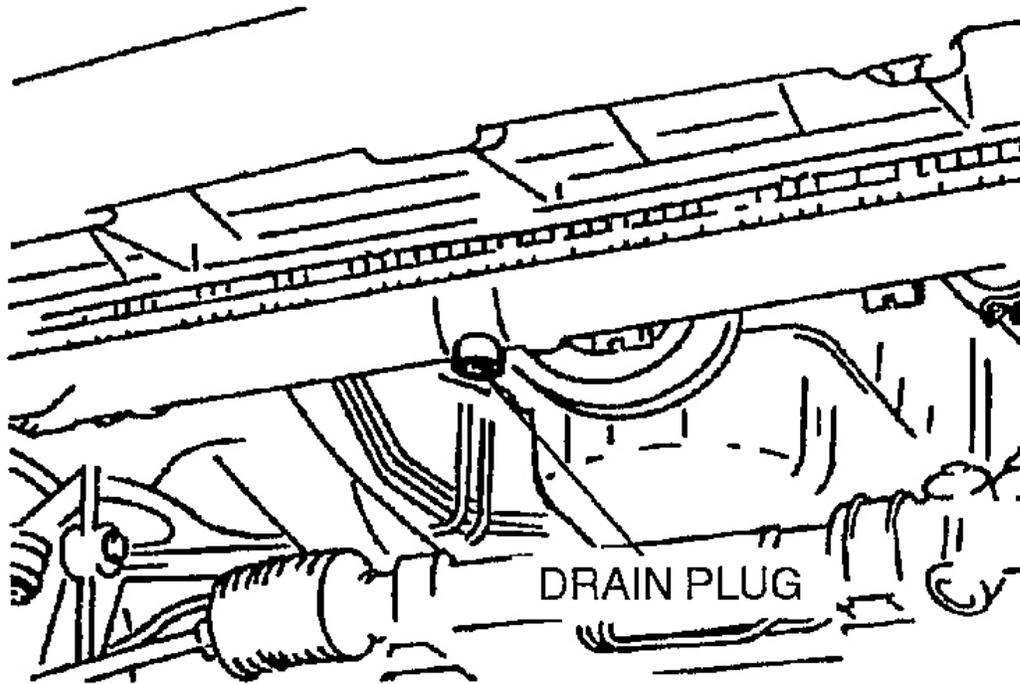
- Never remove the radiator cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes. When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.
- Hot engines and the engine coolant can cause severe burns. Turn off the engine and wait until it and the engine coolant have cooled before draining the engine coolant.

## **ENGINE COOLANT LEVEL INSPECTION**

1. Remove the radiator cap. (See COOLING SYSTEM SERVICE WARNINGS.)
2. Verify that the coolant level is near the radiator filler neck.
3. Verify that the coolant level on the coolant reserve tank is between the FULL and LOW marks.
  - If the engine coolant level is below LOW, remove the radiator cap and add coolant. (See COOLING SYSTEM SERVICE WARNINGS.)

## **ENGINE COOLANT REPLACEMENT**

1. Drain the coolant in the coolant reserve tank.
2. Remove the radiator cap and the radiator drain plug. (See COOLING SYSTEM SERVICE WARNINGS.)



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**Fig. 2: Removing Radiator Cap And Radiator Drain Plug**  
Courtesy of MAZDA MOTORS CORP.

3. Drain the coolant into a container.
4. Flush the cooling system with water until all traces of color are gone.
5. Let the system drain completely.
6. Tighten the radiator drain plug.

**Tightening torque**

0.7-1.1 N.m {7-12 kgf.cm, 7-10 in.lbf}

**CAUTION:**

- The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.
- Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down the coolant effectiveness.
- Engine coolant will damage paint. If engine coolant does get on

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**a painted surface, rinse it off quickly.**

- Referring to the following chart, select proper gravity of the coolant.

### ANTIFREEZE SOLUTION MIXTURE PERCENTAGE

Coolant protection	Volume percentage		Gravity at 20 °C {68 °F}
	Water	Coolant	
Above -16 °C {3 °F}	65	35	1.057
Above -26 °C {-15 °F}	55	45	1.072
Above -40 °C {-40 °F}	45	55	1.086

- Slowly pour the coolant into the radiator up to the coolant filler port.

### Filling pace

**1.0 L {1.1 US qt, 0.9 Imp qt}/min [max]**

- Fill the coolant into the coolant reserve tank up to the FULL mark on the coolant reservoir.
- Fully install the radiator cap.
- Start the engine and warm it up.

### CAUTION:

- If the coolant temperature becomes too high, stop the engine to prevent it from overheating.**

- After engine warms up, perform the following steps.
  - Run the engine at **2,500 RPM** for **5 min.**
  - Run the engine at **3,000 RPM** for **5 min.**
  - Repeat steps (1) and (2) several times.
- Stop the engine and wait until it is cool.
- Inspect the coolant level.
  - If it is low, repeat Steps 7-12.
- Verify there is no coolant leakage.

## ENGINE COOLANT LEAKAGE INSPECTION

- Inspect the coolant level. (See **ENGINE COOLANT LEVEL INSPECTION.**)
- Remove the radiator cap.
- Connect a radiator cap tester and the **SST** to the radiator filler neck.

### CAUTION:

- Applying more than 123 kPa {1.25 kgf/cm<sup>2</sup>, 17.8 psi} can damage the hoses, fittings, and other components, and cause leakage.**



**Fig. 3: Connecting Radiator Cap Tester And SST To Radiator Filler Neck**  
Courtesy of MAZDA MOTORS CORP.

4. Apply pressure to the radiator.

**Pressure**

**123 kPa {1.25 kgf/cm<sup>2</sup>, 17.8 psi}**

5. Verify that the pressure is held.
  - If not, inspect the system for coolant leakage.

## ENGINE COOLANT PROTECTION INSPECTION

1. Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.

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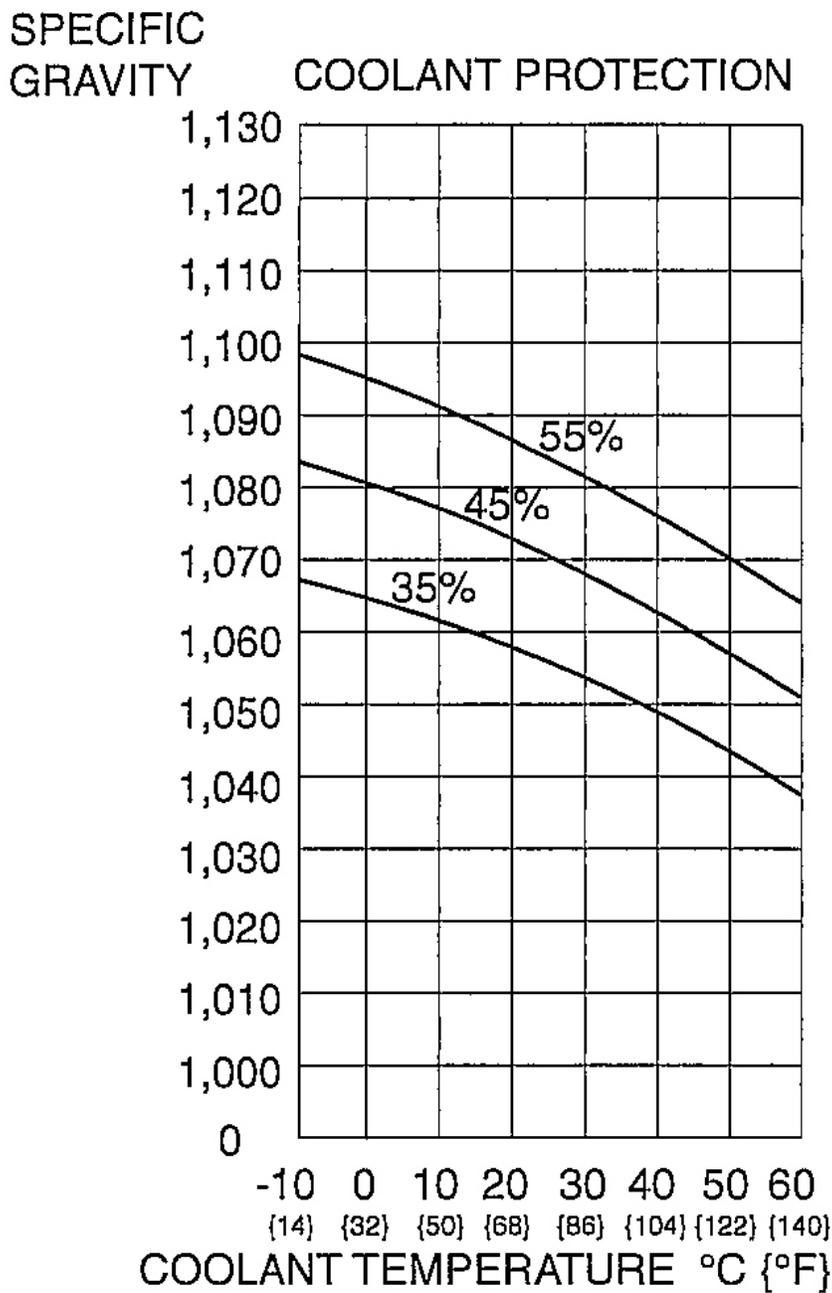
**CAUTION:**

- **The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will reduce the coolant's effectiveness.**

2. Determine the coolant protection by referring to the graph shown.
  - If the coolant protection is not proper, add water or coolant.

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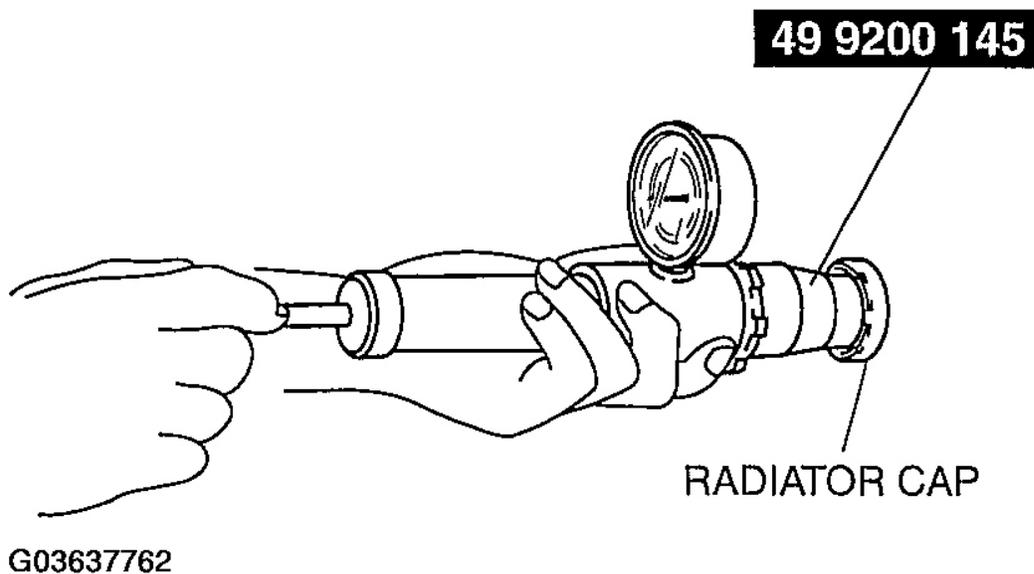
**Fig. 4: Engine Coolant Protection Graph**  
Courtesy of MAZDA MOTORS CORP.

**RADIATOR CAP INSPECTION**

**WARNING:**

- Never remove the radiator cap while the engine is running, or when the engine and radiator are hot. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes. When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Attach the radiator cap to a radiator cap tester with the SST . Apply pressure gradually.



**Fig. 5: Attaching Radiator Cap To Radiator Cap Tester With SST**  
 Courtesy of MAZDA MOTORS CORP.

2. Verify that the pressure becomes stable within the specification.
  - If the pressure is held for **10 s** , the radiator cap is normal.

**Pressure**

94-122 kPa {0.95-1.25 kgf/cm<sup>2</sup>, 13.5-17.7 psi}

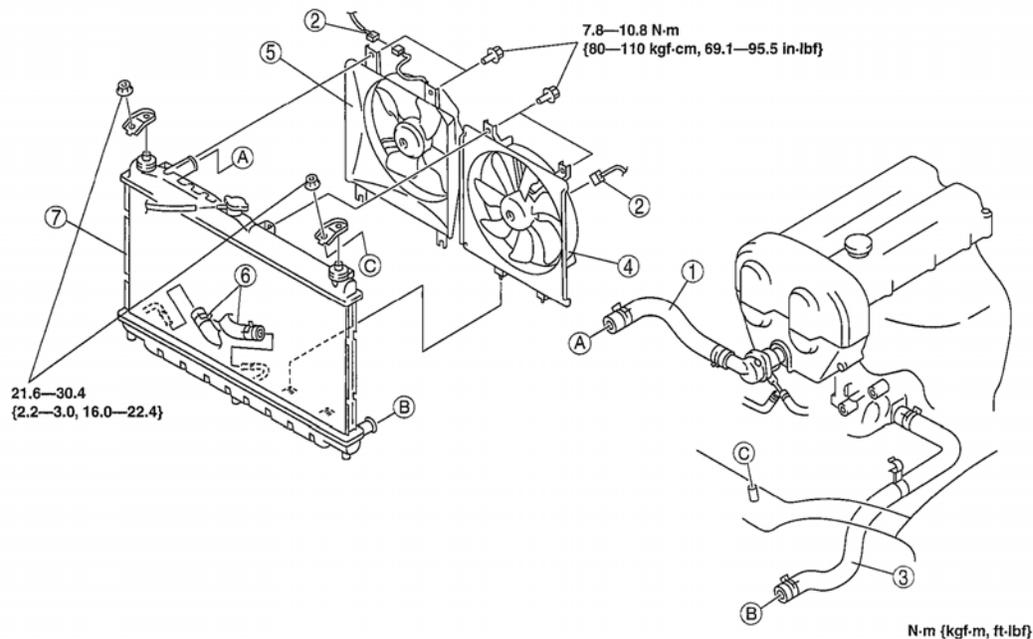
**RADIATOR REMOVAL/INSTALLATION [BP]**

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**WARNING:** • Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT.**)
3. Remove the air hose.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Upper radiator hose
2	Cooling fan motor connector and condenser fan motor connector
3	Lower radiator hose
4	Cooling fan

5	Condenser fan
6	Oil hose (AT) (See OIL COOLER REMOVAL/ INSTALLATION.)
7	Radiator

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**Fig. 6: Exploded View Of Radiator & Torque Specifications**  
Courtesy of MAZDA MOTORS CORP.

6. Add engine coolant. (See **ENGINE COOLANT REPLACEMENT.**)
7. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION.**)

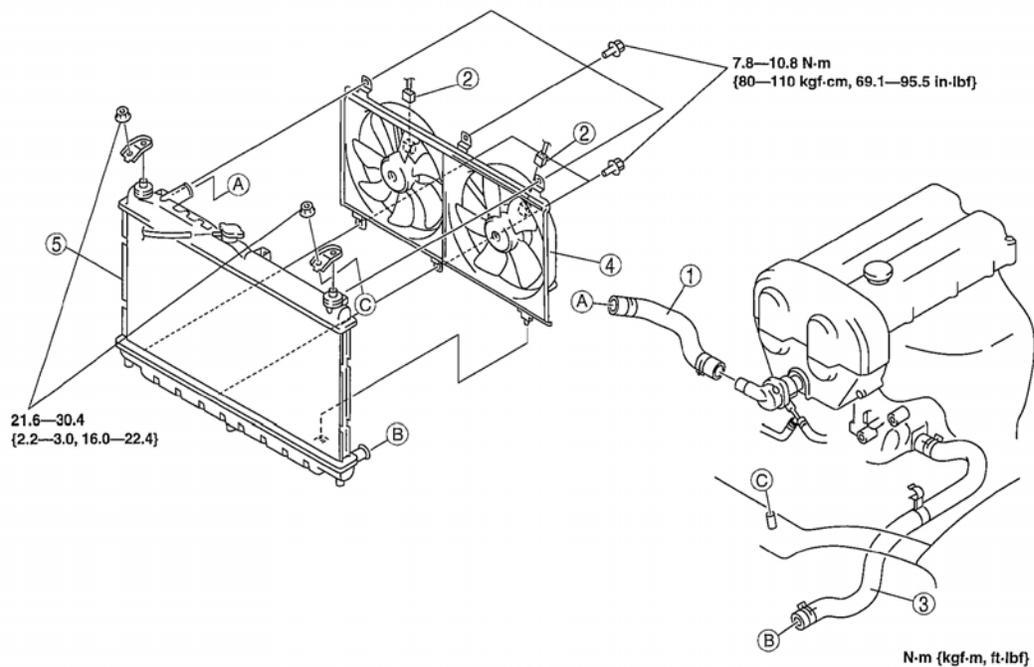
## RADIATOR REMOVAL/INSTALLATION [BP WITH TC]

**WARNING:** • Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.

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1. Disconnect the negative battery cable.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT.**)
3. Remove the air hose No.1 and No.2. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [BP WITH TC]** .)
4. Set the air pipe No.3 out of the way.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



1	Upper radiator hose
2	Fan motor connector No.1 and No.2
3	Lower radiator hose

4	Cooling fan component
5	Radiator

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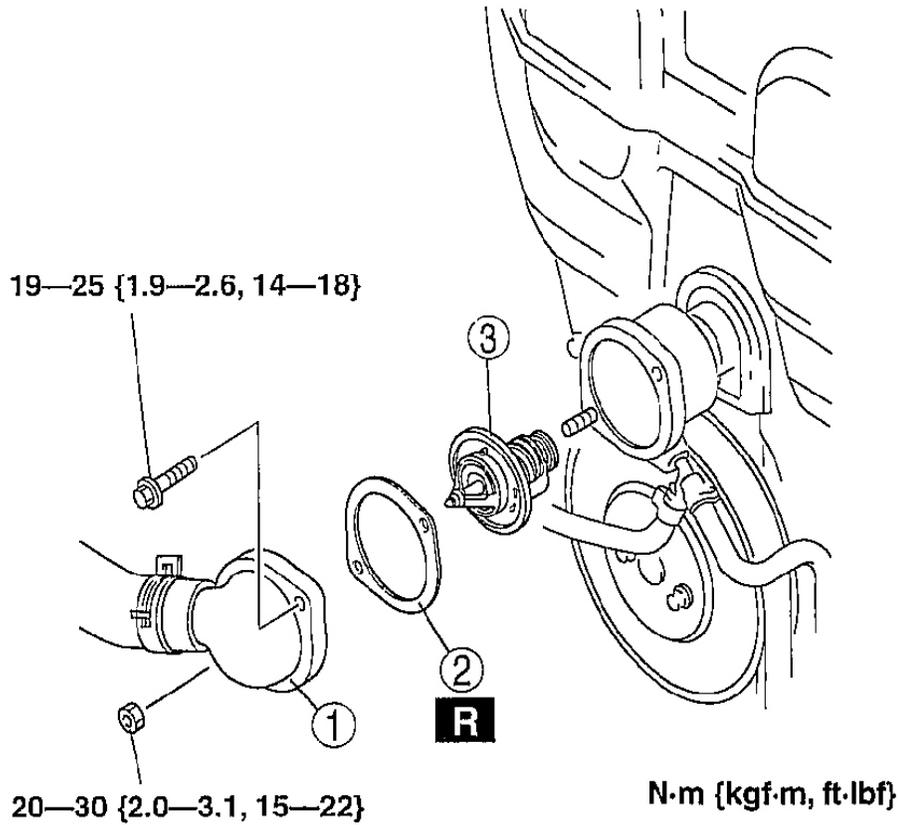
**Fig. 7: Exploded View Of Radiator With Torque Specifications**  
Courtesy of MAZDA MOTORS CORP.

7. Add engine coolant. (See **ENGINE COOLANT REPLACEMENT.**)
8. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION.**)

## THERMOSTAT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the air hose (without TC).
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT.**)

4. Remove in the order indicated in the table.



1	Thermostat cover
2	Thermostat cover gasket (See Thermostat Cover Gasket Installation Note.)
3	Thermostat (See Thermostat Installation Note.)

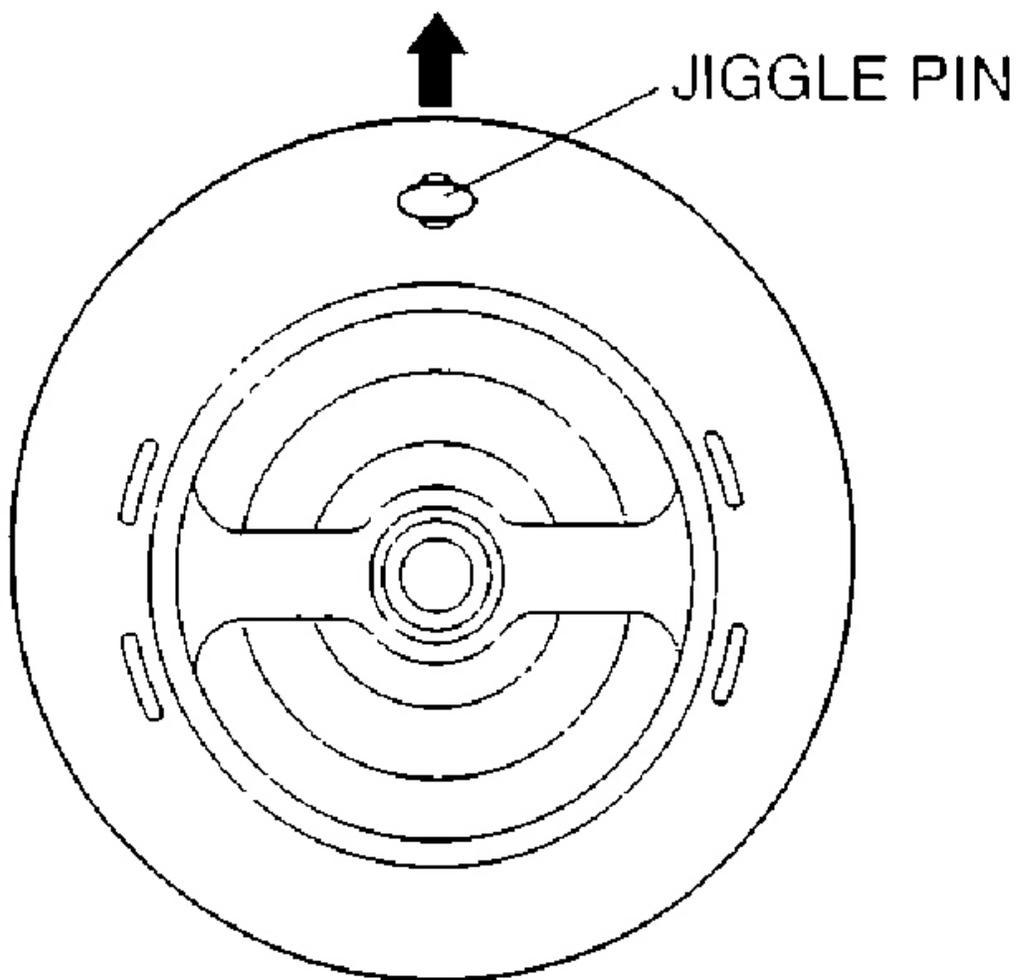
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**Fig. 8: Identifying Thermostat And Cover With Torque Specifications**  
 Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

### THERMOSTAT INSTALLATION NOTE

1. Install the thermostat into the cylinder head with the jiggle pin at the top.

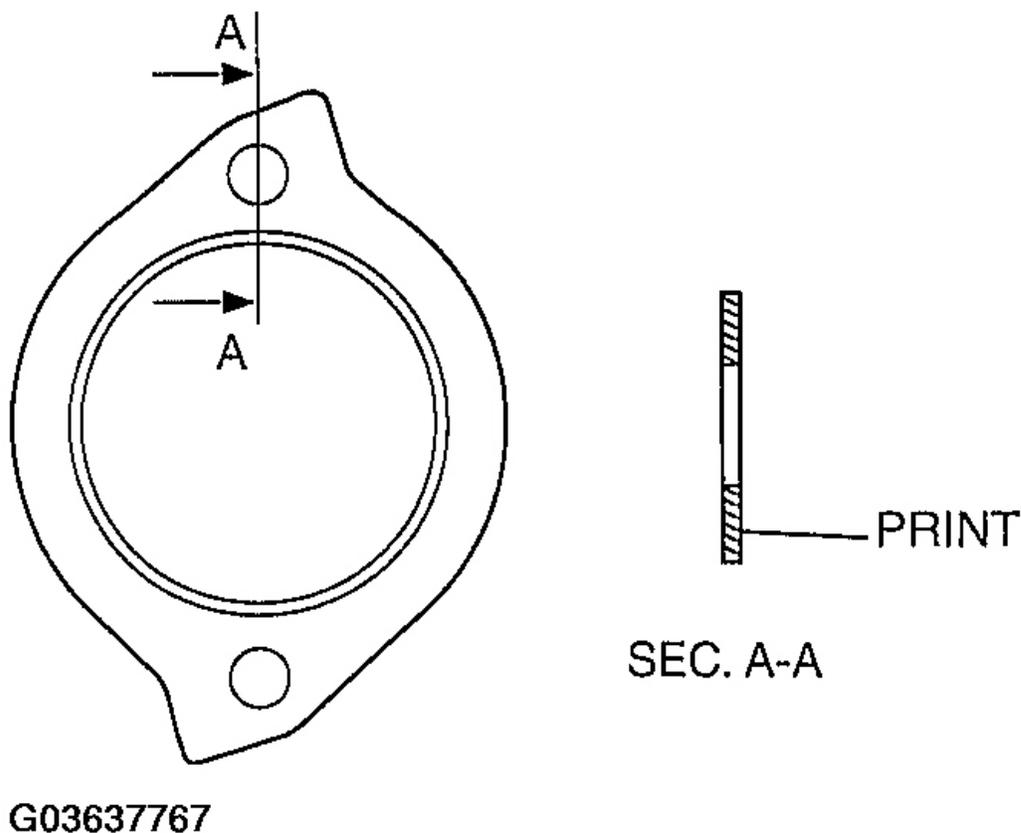


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**Fig. 9: Installing Thermostat Into Cylinder Head With Jiggle Pin At Top**  
Courtesy of MAZDA MOTORS CORP.

### THERMOSTAT COVER GASKET INSTALLATION NOTE

1. Install a new gasket with the seal print side facing the cylinder head.



**Fig. 10: Installing Gasket With Seal Print Side Facing Cylinder Head**  
 Courtesy of MAZDA MOTORS CORP.

### THERMOSTAT INSPECTION

1. Visually check that the thermostat valve is closed.
2. Place the thermostat and a thermometer in water.

**WARNING:**

- During inspection, the thermostat and water are extremely hot and they can cause burns. Do not touch the thermostat and water directly.

3. Heat the water and check the following.
  - If not as specified, replace the thermostat.

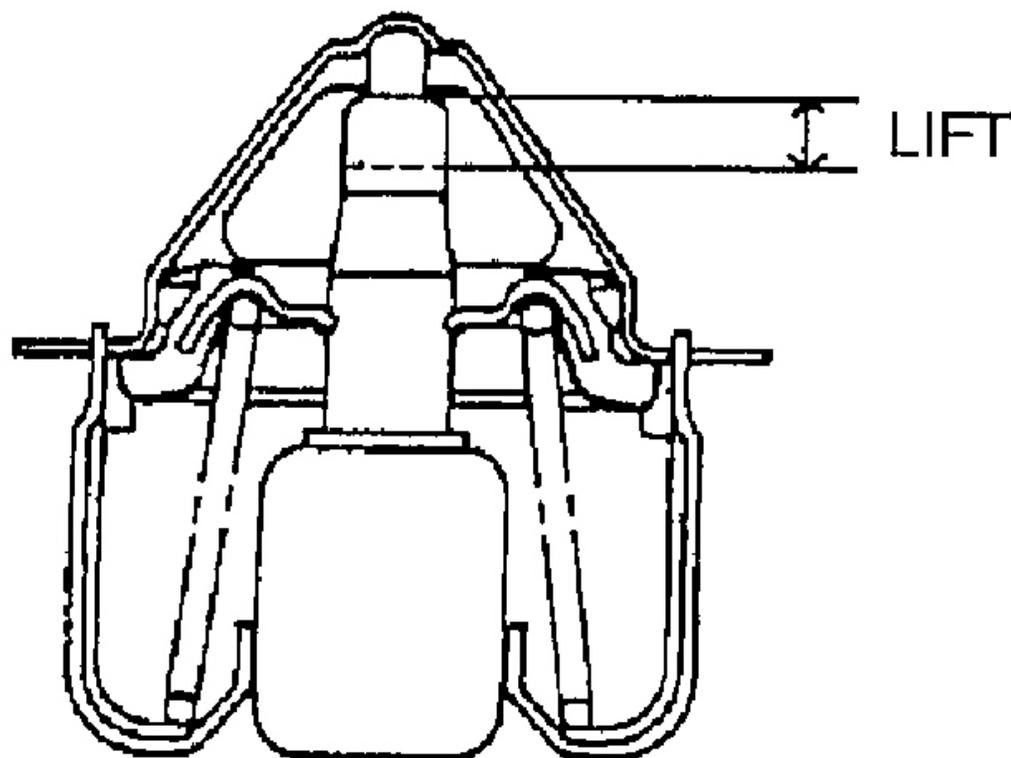
### HEAT WATER SPECIFICATION

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Condition		Specification
Initial-opening temperature	°C {°F}	83.5-86.5 {183-187}
Full-open temperature	°C {°F}	100 {212}
Full-open lift	mm {in}	8.5 {0.33}



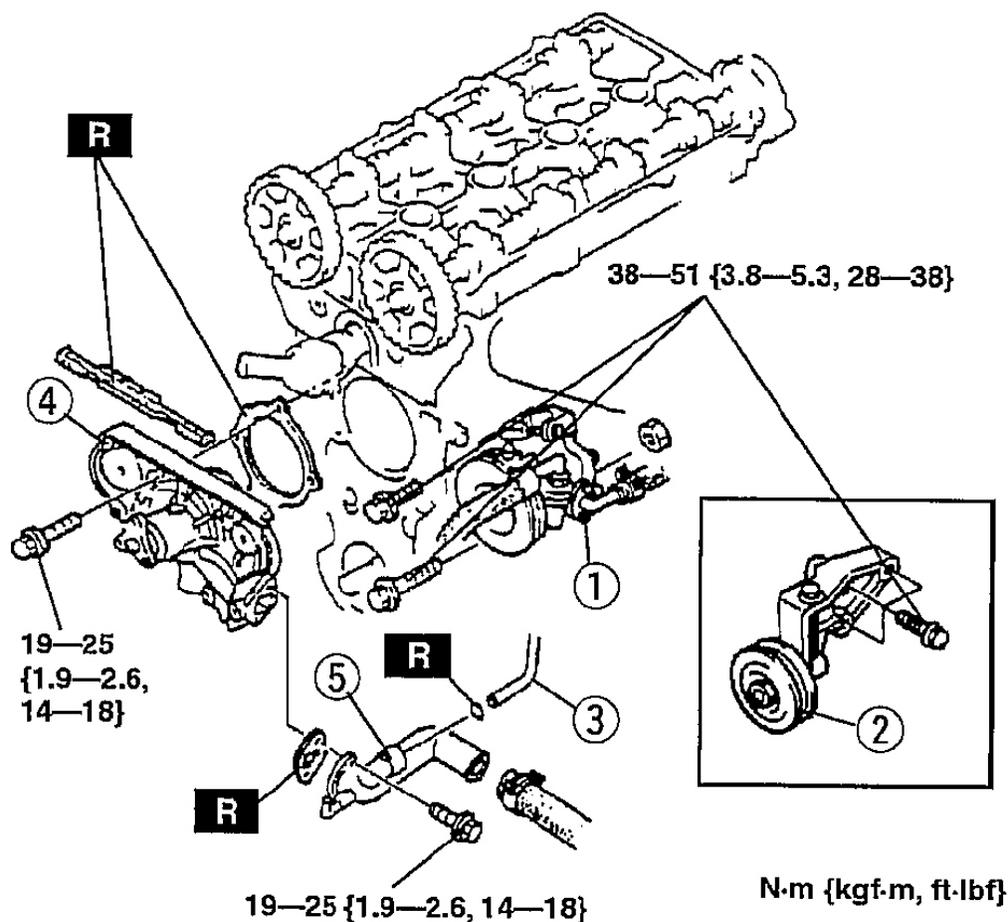
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**Fig. 11: Identifying Full-Open Lift**  
Courtesy of MAZDA MOTORS CORP.

### WATER PUMP REMOVAL/INSTALLATION

1. Remove the air cleaner.
2. Remove the timing belt. (See **TIMING BELT REMOVAL/INSTALLATION** .)
3. Remove the exhaust manifold insulator. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .) (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP WITH TC]** .)
4. Set the A/C compressor out of the way.

5. Remove in the order indicated in the table.



1	P/S oil pump (See P/S Oil Pump Removal Note.)
2	Idler (without P/S oil pump)
3	Water bypass pipe
4	Water pump (See Water Pump Installation Note.)
5	Water inlet pipe

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**Fig. 12: Installing Water Pump & Torque Specifications**

Courtesy of MAZDA MOTORS CORP.

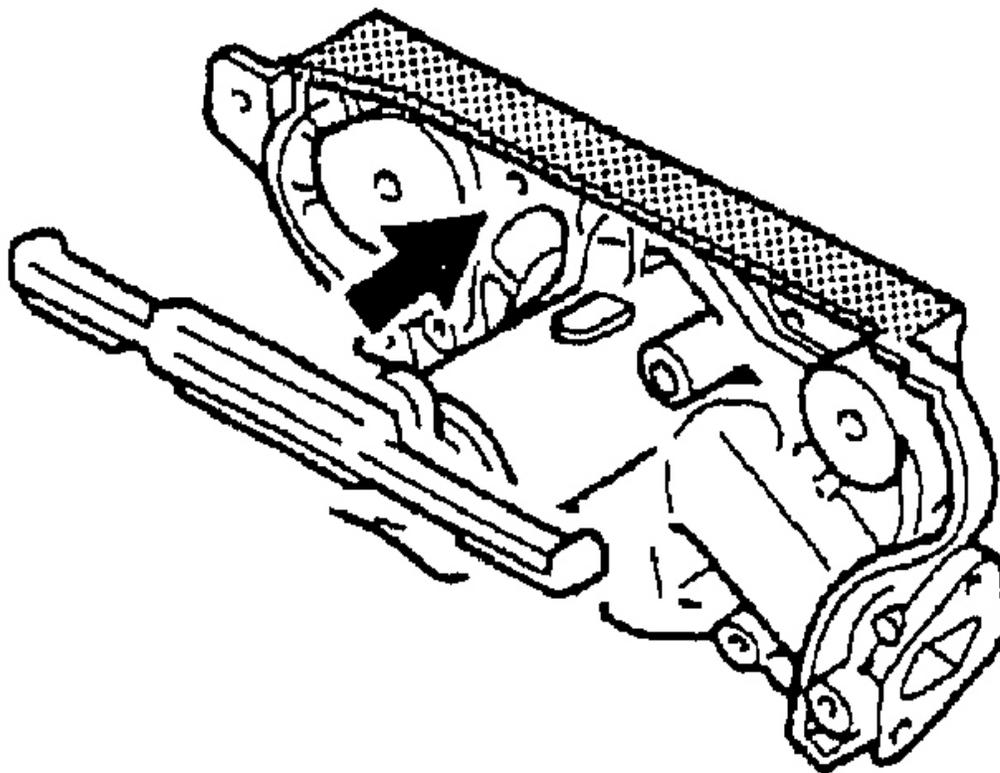
6. Install in the reverse order of removal.

#### P/S OIL PUMP REMOVAL NOTE

1. Remove the P/S oil pump with the oil hose still connected.
2. Position the P/S oil pump so that it is out of the way.

#### WATER PUMP INSTALLATION NOTE

1. Install the new rubber seal with the bonding agent.

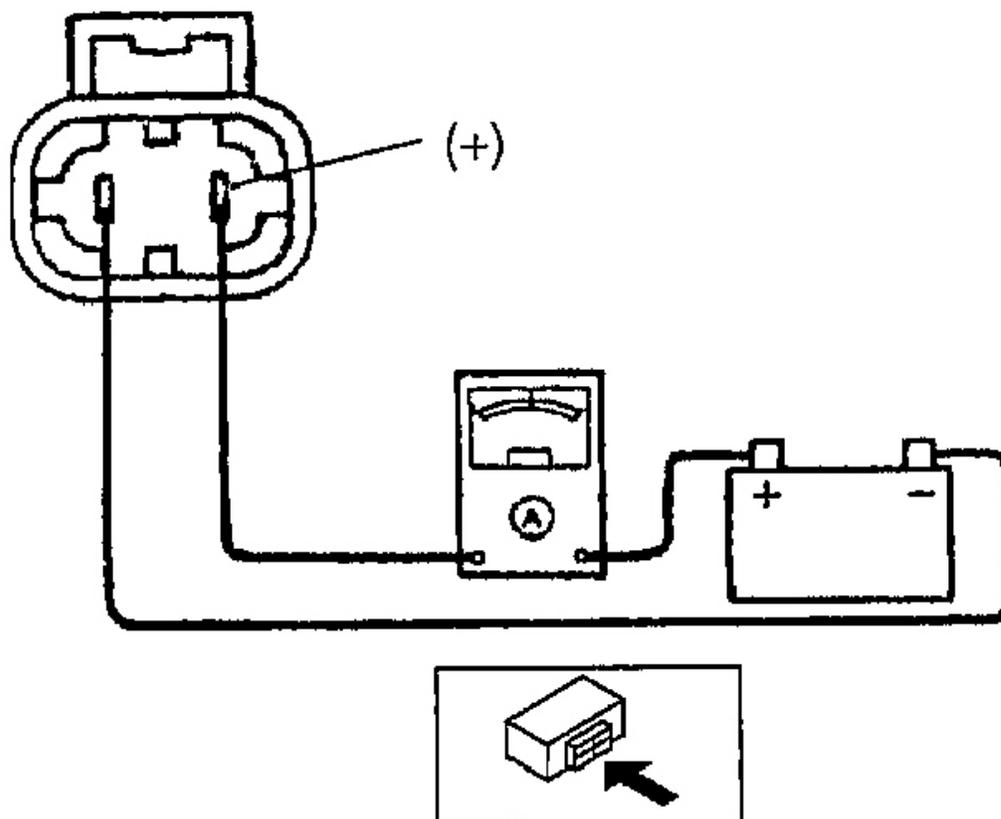


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**Fig. 13: Installing Rubber Seal With Bonding Agent**  
Courtesy of MAZDA MOTORS CORP.

## COOLING FAN MOTOR INSPECTION [BP]

1. Verify that the battery is fully charged. (See **BATTERY INSPECTION** .)
2. Disconnect the cooling fan motor connector.
3. Connect battery positive voltage and an ammeter to the cooling fan motor connector.



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**Fig. 14: Connecting Battery Positive Voltage And An Ammeter To Cooling Fan Motor Connector**  
Courtesy of MAZDA MOTORS CORP.

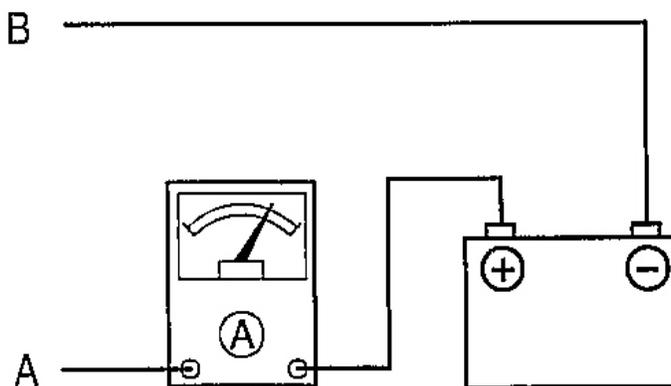
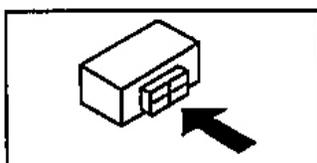
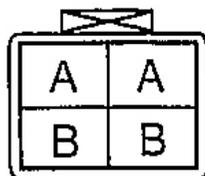
4. Verify that the cooling fan motor operates smoothly at the standard current draw.
  - If not as specified, replace the cooling fan motor.

**Standard current**

## 5.9 (A) [12V]

**COOLING FAN MOTOR INSPECTION [BP WITH TC]**

1. Verify that the battery is fully charged. (See **BATTERY INSPECTION** .)
2. Disconnect the fan motor connector.
3. Connect battery positive voltage and an ammeter to the fan motor connector.

FAN MOTOR  
CONNECTORFAN MOTOR  
NO. 1, NO. 2

**Fig. 15: Connecting Battery Positive Voltage And An Ammeter To Fan Motor Connector**  
Courtesy of MAZDA MOTORS CORP.

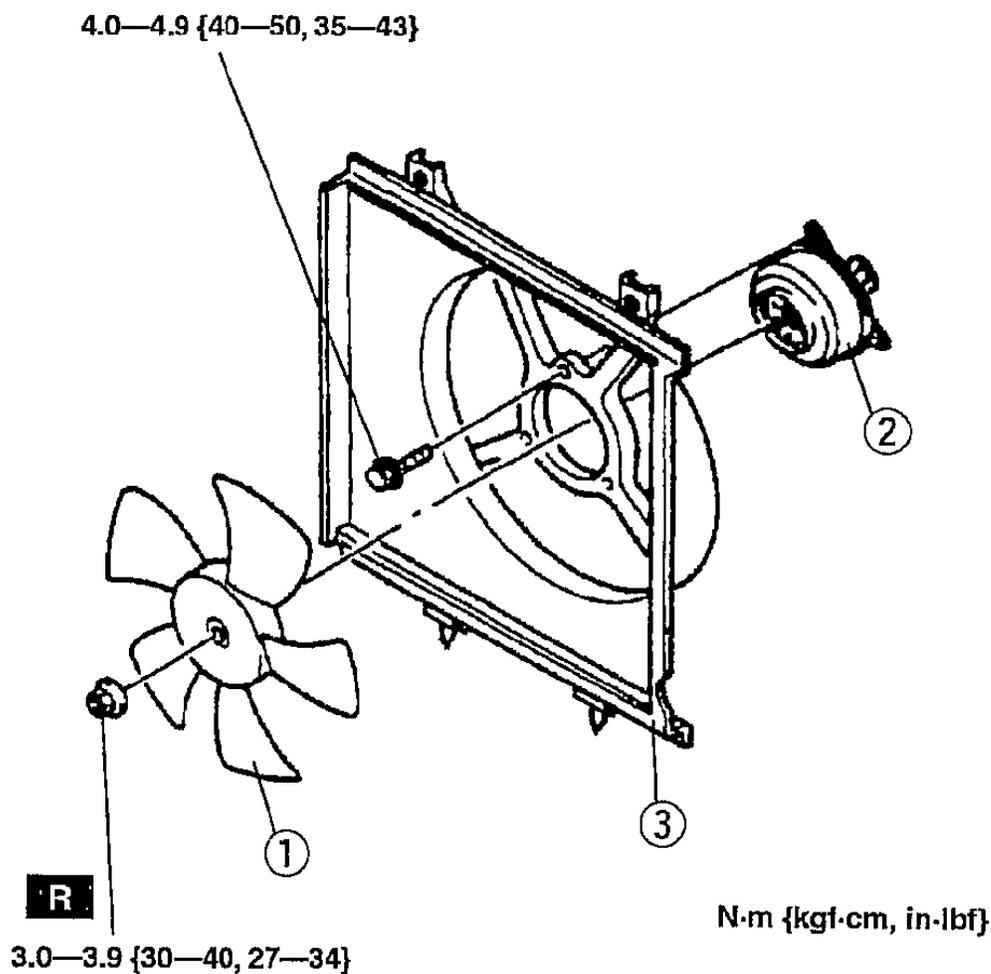
4. Verify that the fan motor operates smoothly at the standard current draw.
  - If not within the specification, replace the fan motor.

**Standard current**

**10 (A) [12 V]**

**COOLING FAN MOTOR REMOVAL/INSTALLATION [BP]**

1. Remove the cooling fan. (See **RADIATOR REMOVAL/INSTALLATION [BP]**.)
2. Remove in the order indicated in the table.



1	Cooling fan blade
2	Cooling fan motor
3	Radiator cowl

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**Fig. 16: Removing Cooling Fan & Torque Specifications**  
 Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.

### COOLING FAN MOTOR REMOVAL/INSTALLATION [BP WITH TC]

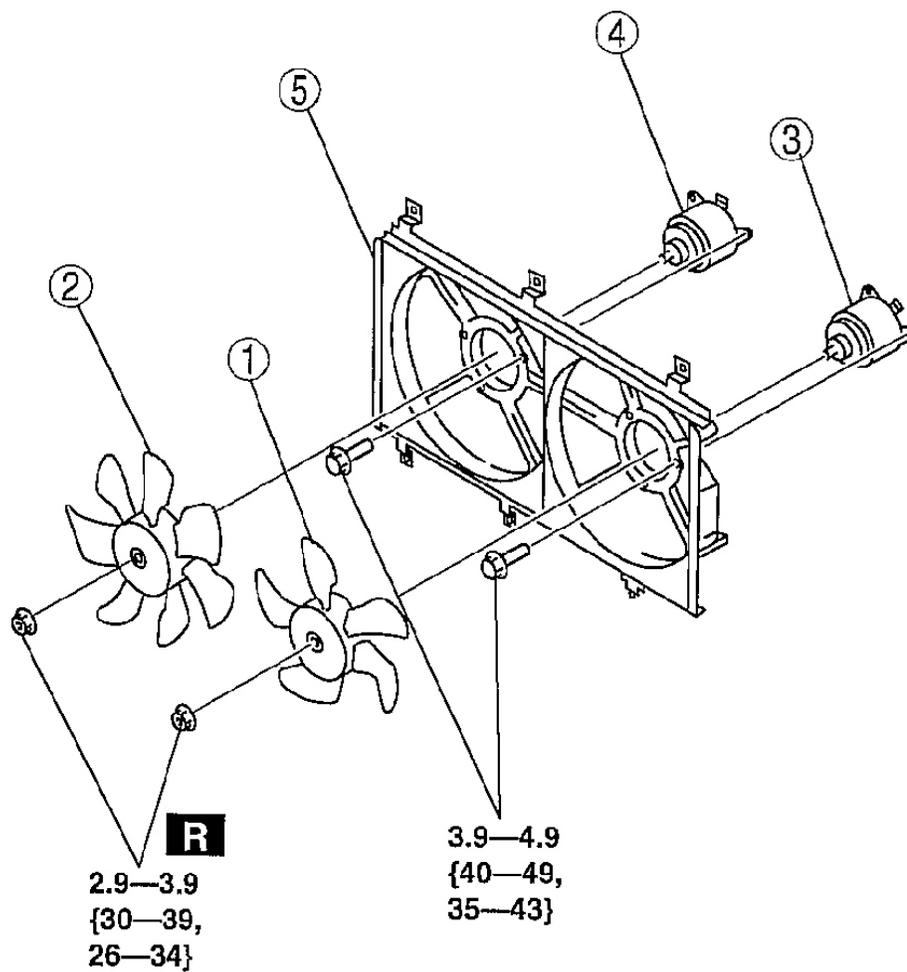
1. Remove the cooling fan component. (See RADIATOR REMOVAL/INSTALLATION [BP WITH

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**TCI.)**

2. Remove in the order indicated in the table.



N·m {kgf·cm, in·lbf}

1	Fan blade No.1
2	Fan blade No.2
3	Fan motor No.1
4	Fan motor No.2
5	Radiator cowling

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**Fig. 17: Removing Cooling Fan Component & Torque Specifications**  
Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.